Municipal Biosolids Landspreading

Kewaunee County Land and Water Conservation Committee Board Meeting

Alexis Heim Peter

DNR Wastewater Specialist

July 9, 2019

Overview

- Regulatory Authority
- Sludge Quality Standards
- Site Review and Approval Process
- Soil Testing Requirements
- Kewaunee County Landspreading

Regulatory Authority

Federal requirements set nation wide standards.

- **40 CFR Part 503**

DNR is delegated by EPA for sewage sludge management

- **s. 283.31 Wis. Stats** - requires permits for discharge of pollutants to waters of the state
- **s. 283.82 Wis. Stats** – DNR regulates sewage sludge
- **ch. NR 204 Wis. Adm. Code** - technical standards and monitoring requirements
- **WPDES Permits -** facility specific requirements

Oversight

Federal Requirements

State Statutes

Administrative Code

WPDES Permits

nebra
North East Biosolids & Residuals Association

Regulatory Authority

Requirements

- Annual Monitoring
  - metals, nutrients, other parameters based on industrial contributors
- Annual Reporting
  - volumes disposed, acres spread on, nutrients applied, metals loadings
- Allows for:
  - landspreading,
  - landfilling,
  - incineration, or
  - transfer to another WPDES permitted entity

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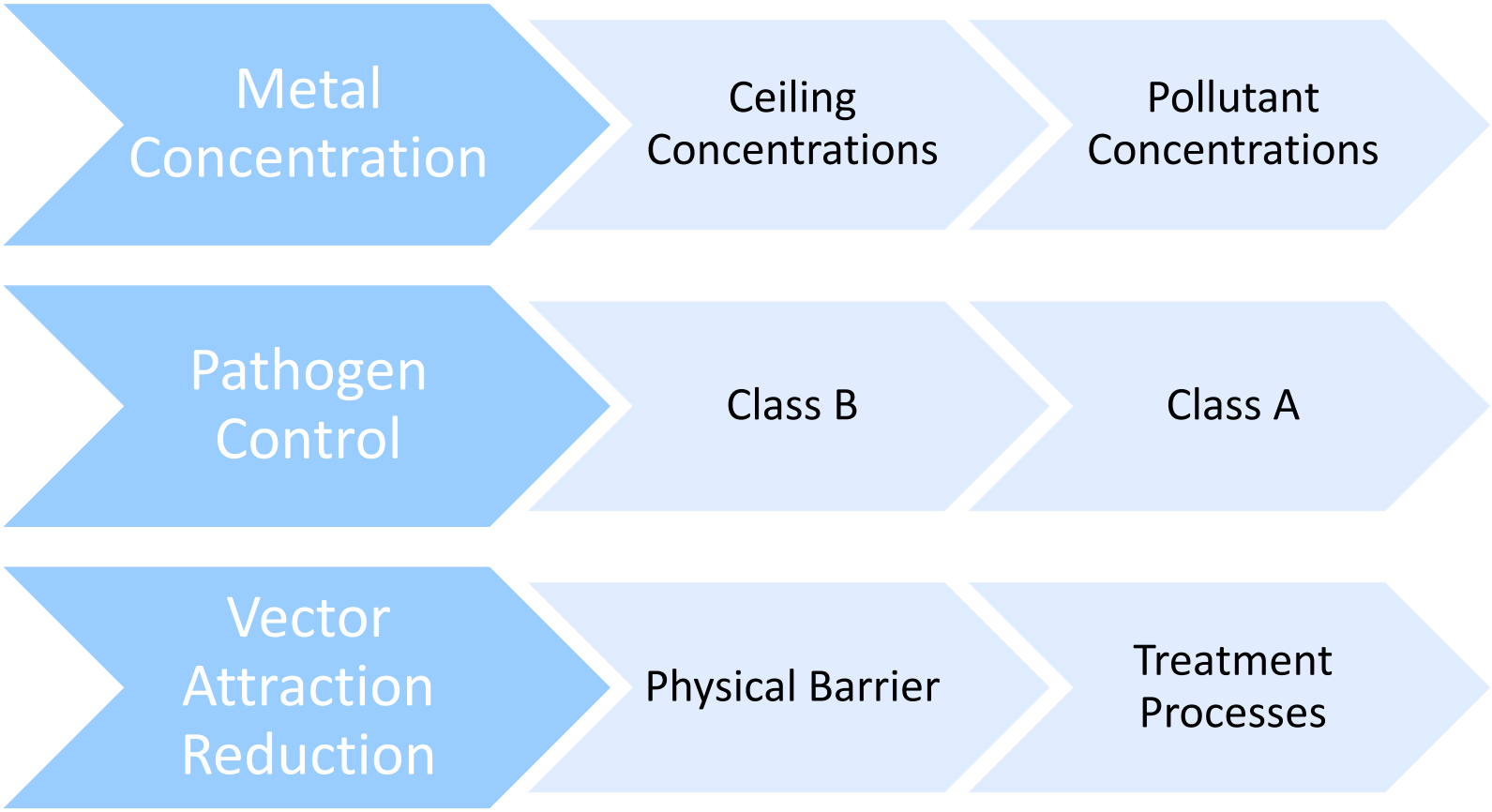
Sludge Quality Standards



Classification of sludge is based on these three categories.
Greater treatment and investment = Higher quality

Sludge Quality Standards

Metal Concentration → Ceiling Concentrations → Pollutant Concentrations

Table 1
Ceiling Concentrations

Pollutant	Ceiling concentrations (milligrams per kilogram – ppm) (dry weight)
Arsenic	75
Cadmium	85
Copper	4300
Lead	840
Mercury	57
Molybdenum	75
Nickel	420
Selenium	100
Zinc	7500

Table 3
Pollutant Concentrations

Pollutant	Monthly average concentrations (milli-grams per kilogram – ppm) (dry weight)
Arsenic	41
Cadmium	39
Copper	1500
Lead	300
Mercury	17
Molybdenum	Deleted Until EPA Revises
Nickel	420
Selenium	100
Zinc	2800

Values are set by EPA based on scientific study of impact to human health and the environment

WISCONSIN DNR
Department of Natural Resources

Kewaunee County Treatment Plants

2018 Sludge Results

Metal Concentration → Ceiling Concentrations → Pollutant Concentrations

Parameter	unit	Pollutant Concentration	Algoma	Casco	Denmark
Arsenic	ppm	41	5.5	4.8	2.52
Cadmium	ppm	39	1.7	1.4	0.643
Copper	ppm	1500	982	810	444
Lead	ppm	300	22.4	56	9.01
Mercury	ppm	17	0.66	0.87	1.17
Molybdenum	ppm	N/A	16.1	16	9.24
Nickel	ppm	420	18	30	28.6
Selenium	ppm	100	8.3	12	2.34
Zinc	ppm	2800	1030	1100	643

Sludge Quality Standards

Pathogen Control → Class B → Class A

Table 6
Class B

Parameter	Unit	Limit
Fecal Coliform	MPN or CFU/g TS	2,000,000
OR ONE OF THE FOLLOWING PROCESS OPTIONS		
Aerobic Digestion	Air Drying	
Anaerobic Digestion	Composting	
Alkaline Stabilization	PSRP Equivalent	

Table 5
Class A

Parameter	Unit	Limit
Fecal Coliform	MPN/g TS	1000
or		
Salmonella	MPN/4g TS	3
AND, ONE OF THE FOLLOWING PROCESS OPTIONS		
Temp/Time based on % Solids	Alkaline Treatment	
Prior test for Enteric Virus/Viable Helminth Ova	Post test for Enteric Virus/Viable Helminth Ova	
Composting	Heat Drying	
Heat Treatment	Thermophilic Aerobic Digestion	
Beta Ray Irradiation	Gamma Ray Irradiation	
Pasteurization	PFRP Equivalent Process	

NR 204.07(6)(a)2. and (b)2. Wis. Adm. Code list specific requirements for each of these processes

Kewaunee County Treatment Plants

Pathogen Control → Class B → Class A

Facility	Process	Class
Algoma	Fecal Monitoring	B
Casco	Aerobic Digestion & Fecal Monitoring	B
Denmark	Anaerobic Digestion & Fecal Monitoring	B

Sludge Quality Standards

Vector Attraction Reduction | Physical Barrier | Treatment Processes

Table 7
Vector Attraction Reduction
(One of the following shall be satisfied)

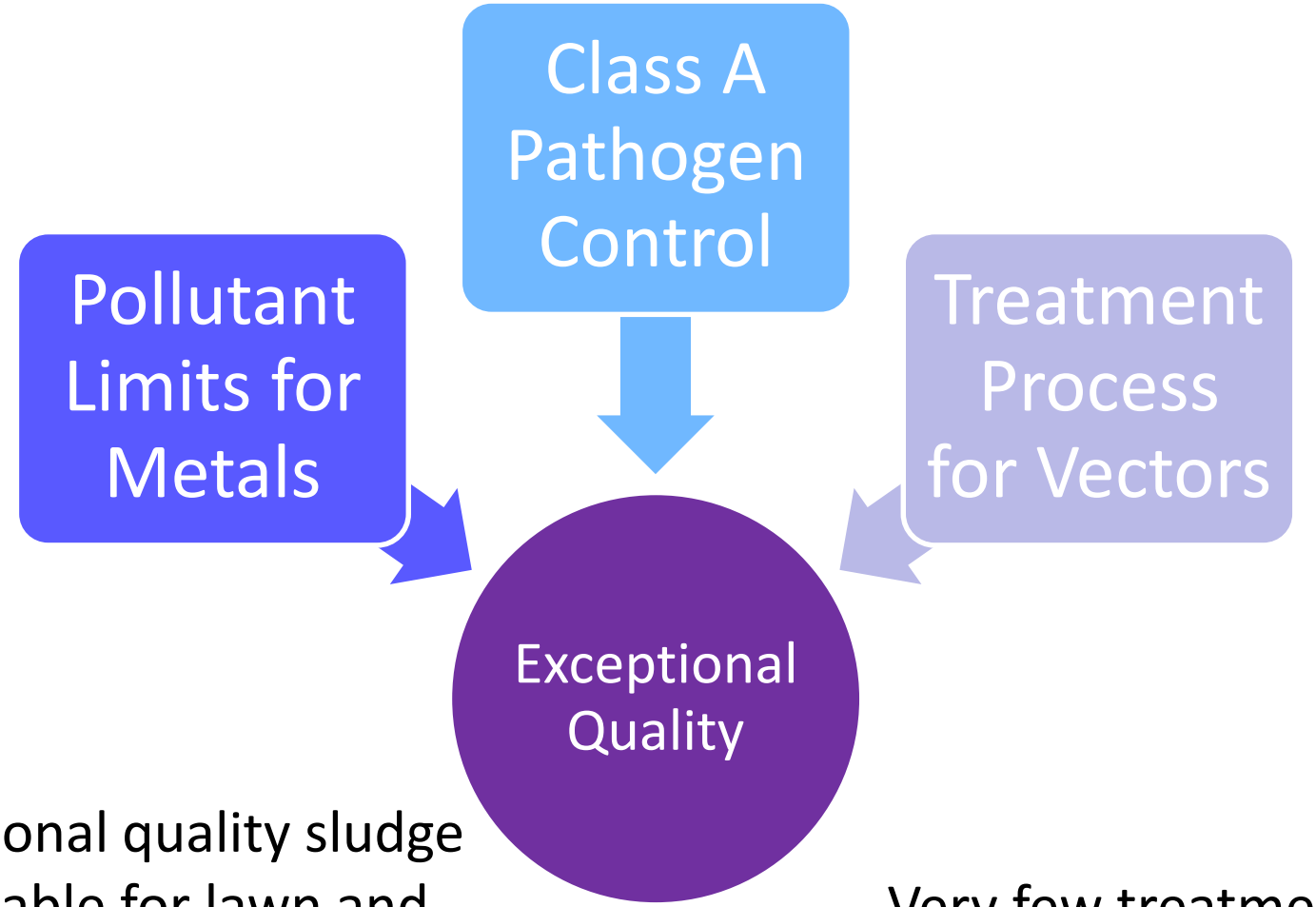
Option	Limit	Where/When Requirements Must Be Met
Volatile Solids Reduction	>38%	Across the process
Specific Oxygen Uptake Rate	<1.5 mg O_2/hr/g TS	On aerobic stabilized sludge
Anaerobic benchscale test	<17% VS reduction	On anaerobic digested sludge
Aerobic benchscale test	<15% VS reduction	On aerobic digested sludge
Aerobic Process	>14 days, T >40°C and avg T >45°C	On composted sludge
pH adjustment	>12 S.U. (for 2 hours) and >11.5 (for an additional 22 hours)	When applied or bagged
Drying without primary solids	>75 % TS	When applied or bagged
Drying with primary solids	>90 % TS	When applied or bagged
Equivalent process	Determined by the department	Varies with process
Injection	—	When applied
Incorporation	—	When applied

NR 204.07(7) Wis. Adm. Code list specific requirements for each of these processes

Kewaunee County Treatment Plants

Facility	Process	Level
Algoma	Injection when land applied	Physical Barrier
Casco	Incorporation within 6 hours	Physical Barrier
Denmark	Volatile Solids Reduction & Injection when land applied	Treatment Process

Sludge Classifications



Exceptional quality sludge is suitable for lawn and home garden spreading

Very few treatment plants in WI produce EQ biosolids

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Site Review & Approval Process

Site Request Packet Compiled

- Form 3400-053 Site Request includes site specific information
- Soil Maps/ Plat Map
- Landowner Permission
- Nutrient Soil Test Data

Department Review of Packet

- Ensure complete information
- Evaluate soil suitability
- Impose setbacks for fixed features and surface waters

Department Decision

- Suitable site
  - Issue Form 3400-122 Site Approval
  - Provide restriction map
- Unsuitable site
  - Deny and request site specific testing

Site Review & Approval Process

Soil suitability standards

- 36 inches to Bedrock and Groundwater
- <12% Slope (injection or incorporation)
- 0 – 6 inches/hour permeability
- pH of soil is 5.5 or greater when applied

Setbacks

Site Criteria	Surface	Incorporation	Injection
—Community water supply or school	1000 ft.	1000 ft.	1000 ft.
—Other*	250 ft.	250 ft.*	250 ft.*
Minimum distance to residence, busi- ness or recreation area	500 ft.	200 ft.	200 ft.
Minimum distance to residence or busi- ness w/permission	250 ft.	100 ft.	100 ft.
Distance to rural schools and health care facilities	1000 ft.	1000 ft.	500 ft.
Distance to property line	50 ft.**	25 ft.**	25 ft.**
Minimum distance to streams, lakes, ponds, wetlands or channelized waterways connected to a stream, lake, pond or wetland.			
—Slope 0 to <6	100 ft.	50 ft.	25 ft.
—Slope 6 to <12	Not allowed	100 ft.	50 ft.
Soil permeability range (in/hr)	0.2−6.0	0−6.0	0−6.0
—Slope 0 to < 6	200 ft.	150 ft.	100 ft.
—Slope 6 to <12	Not allowed	200 ft.	150 ft.
Minimum distance to grass waterways, or dry run with a 50 foot range grass strip. ***			

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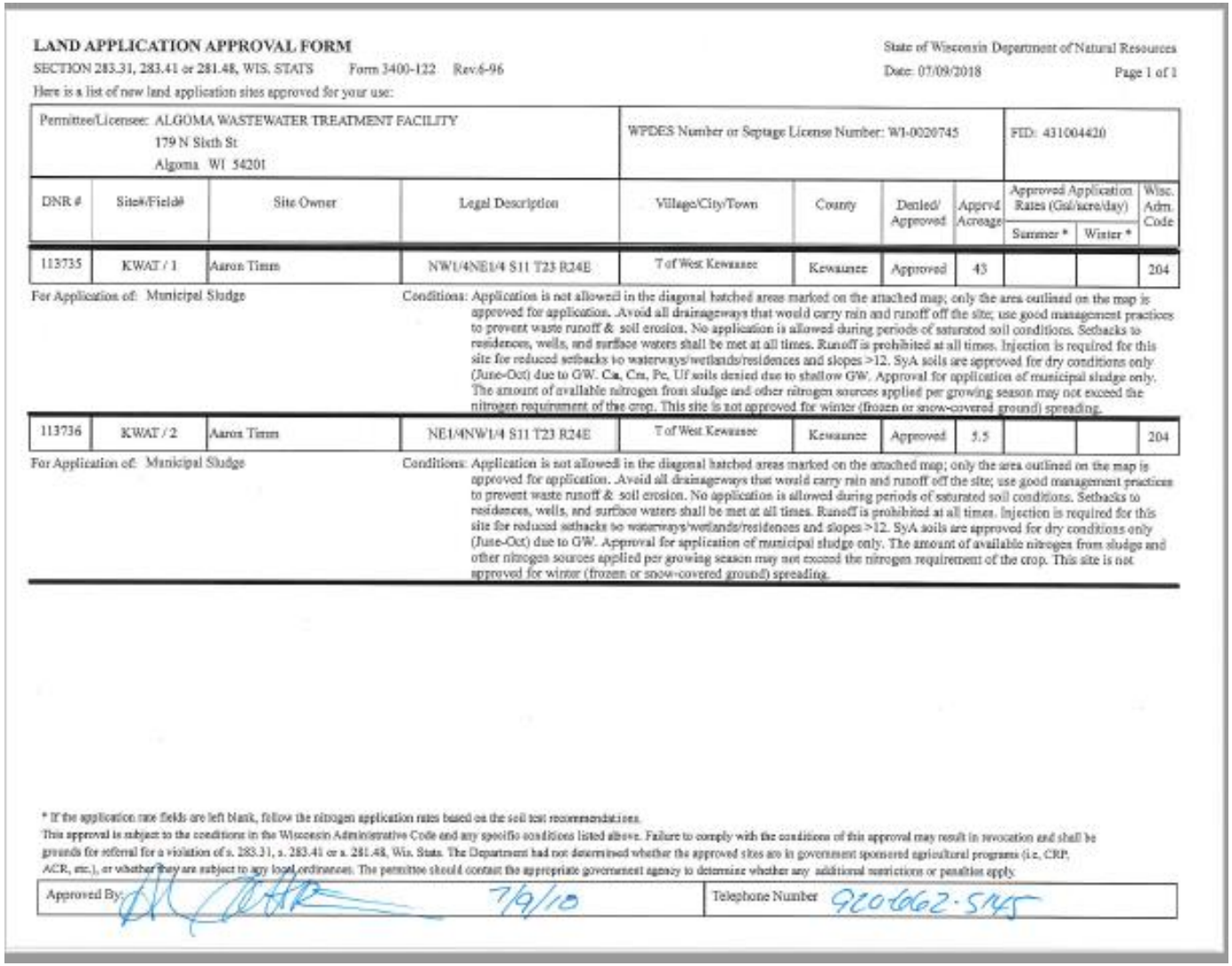
Department of Natural Resources

Site Review & Approval Process



LAND APPLICATION APPROVAL FORM

SECTION 283.31, 283.41 or 281.48, WIS. STATS Form 3400-122 Rev.6-96

State of Wisconsin Department of Natural Resources

Date: 07/09/2018 Page 1 of 1

Here is a list of new land application sites approved for your use:

Permittee/Licensee: ALGOMA WASTEWATER TREATMENT FACILITY 179 N Sixth St Algoma WI 54201	WPDES Number or Septage License Number: WI-0020745	FID: 431004420

DNR #	Site#/Field#	Site Owner	Legal Description	Village/City/Town	County	Denied/ Approved	Apprvd Acreage	Approved Application Rates (Gal/acre/day)		Wisc. Adm. Code
								Summer *	Winter *	
113735	KWAT / 1	Aaron Timm	NW1/4NE1/4 S11 T23 R24E	T of West Kewaunee	Kewaunee	Approved	43			204

For Application of: Municipal Sludge

Conditions: Application is not allowed in the diagonal hatched areas marked on the attached map; only the area outlined on the map is approved for application. Avoid all drainageways that would carry rain and runoff off the site; use good management practices to prevent waste runoff & soil erosion. No application is allowed during periods of saturated soil conditions. Setbacks to residences, wells, and surface waters shall be met at all times. Runoff is prohibited at all times. Injection is required for this site for reduced setbacks to waterways/wetlands/residences and slopes >12. SyA soils are approved for dry conditions only (June-Oct) due to GW. Ca, Cm, Pc, Uf soils denied due to shallow GW. Approval for application of municipal sludge only. The amount of available nitrogen from sludge and other nitrogen sources applied per growing season may not exceed the nitrogen requirement of the crop. This site is not approved for winter (frozen or snow-covered ground) spreading.

113736	KWAT / 2	Aaron Timm	NE1/4NW1/4 S11 T23 R24E	T of West Kewaunee	Kewaunee	Approved	5.5			204

For Application of: Municipal Sludge

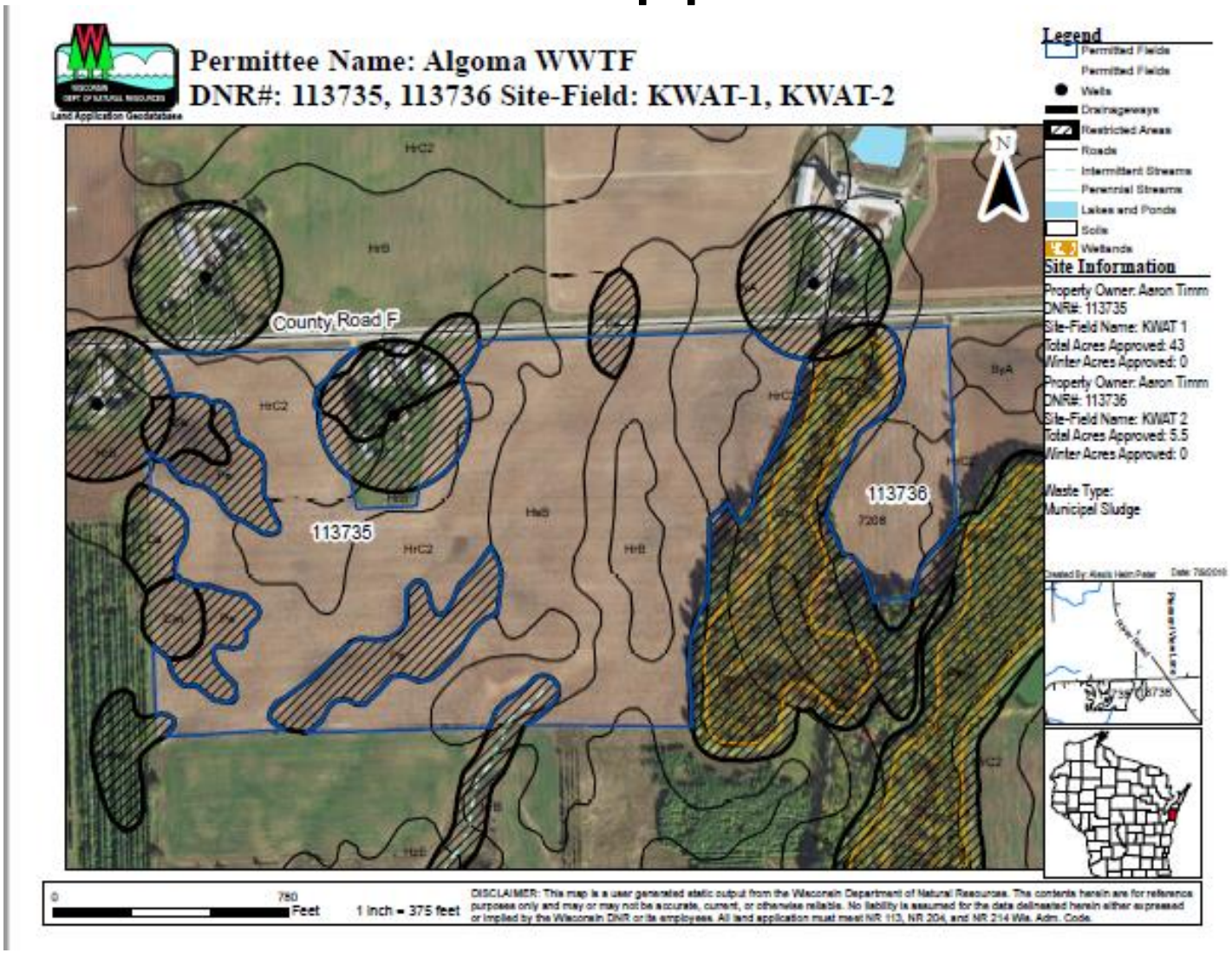
Conditions: Application is not allowed in the diagonal hatched areas marked on the attached map; only the area outlined on the map is approved for application. Avoid all drainageways that would carry rain and runoff off the site; use good management practices to prevent waste runoff & soil erosion. No application is allowed during periods of saturated soil conditions. Setbacks to residences, wells, and surface waters shall be met at all times. Runoff is prohibited at all times. Injection is required for this site for reduced setbacks to waterways/wetlands/residences and slopes >12. SyA soils are approved for dry conditions only (June-Oct) due to GW. Approval for application of municipal sludge only. The amount of available nitrogen from sludge and other nitrogen sources applied per growing season may not exceed the nitrogen requirement of the crop. This site is not approved for winter (frozen or snow-covered ground) spreading.

* If the application rate fields are left blank, follow the nitrogen application rates based on the soil test recommendations.

This approval is subject to the conditions in the Wisconsin Administrative Code and any specific conditions listed above. Failure to comply with the conditions of this approval may result in revocation and shall be grounds for referral for a violation of s. 283.31, s. 283.41 or s. 281.48, Wis. Stats. The Department had not determined whether the approved sites are in government sponsored agricultural programs (i.e. CRP, ACR, etc.), or whether they are subject to any local ordinances. The permittee should contact the appropriate government agency to determine whether any additional restrictions or penalties apply.

Approved By: 7/9/18 Telephone Number 920-662-5745

Site Review & Approval Process



Septage Landspreading

Federal Regulations same as biosolids

State Regulations:

s. 281.48, Wis. Stats & ch. NR 113 –Septage Program

s. 281.17 Wis. Stats & ch. NR 114 – Certification Program

To Landspread Domestic Septage

- Valid department issued business license
- Certified Grade L operator
- Approved Fields (same process)
- Pathogen Control
- Vector Attraction Reduction
- Daily Servicing and Disposal Logs
- Reports annually to the department (rates & locations)

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Soil Testing Requirements

"A site or field may not be used for land application of sludge unless the soil on the site has been tested at lest once in the 4 years prior to land application" - s. NR 204.06(6)(c) Wis. Adm. Code

Treatment plant is responsible for having soil tested compliant with code requirements.

A2100

Sampling soils for testing

John B. Peters and Carrie A.M. Laboski

A soil test is the only practical way of determining whether lime and fertilizer are needed for a specific crop. However, if a soil sample does not represent the general soil conditions of the field, the recommendations based on the sample may be misleading. An acre of soil to a 6-inch depth weighs about 1,000 tons, yet less than 1 ounce of soil is used for each test in the laboratory. Therefore, it is very important that the soil sample be representative of the entire field.

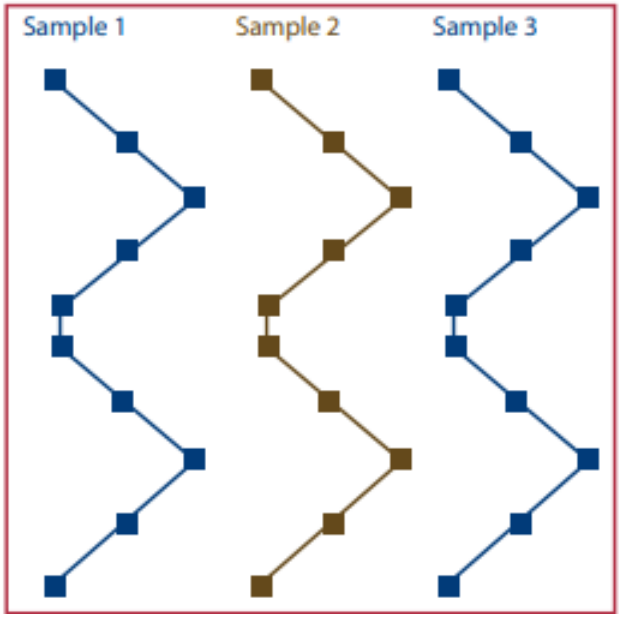
Before collecting soil samples, you should determine the overall approach of the nutrient management program. This will affect the number of samples needed and method by which samples will be taken. Specifically, will nutrient and lime applications be made at a single uniform rate for the whole field being tested or will applications be made at variable rates to field areas that have been identified as having different soil test levels?

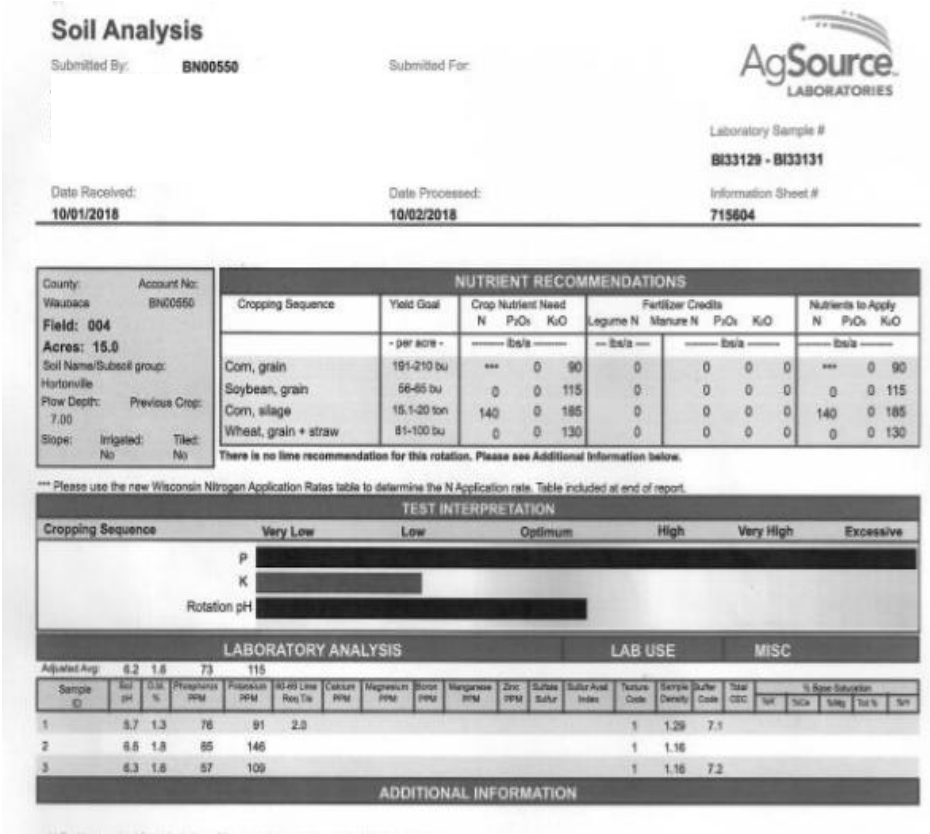
Soil Testing Requirements

Representative soil samples taken in accordance with A-2100 UW Extension Bulletin

Analyzed for nutrients to determine application rates to meet nutrient crop needs (N-P-K)

Figure1. Recommended W-shaped sampling pattern for a 15-acre field. Each sample should be composed of at least 10 cores.





Soil Analysis

Submitted By: BN00550 Submitted For: AgSource LABORATORIES

Laboratory Sample #: BI33129 - BI33131

Date Received: 10/01/2018 Date Processed: 10/02/2018 Information Sheet #: 715604

County: Waupaca Account No: BN00550
Field: 004
Acres: 15.0
Soil Name/Subsoil group: Hortonville
Plow Depth: 7.00 Previous Crop:
Slope: Irrigated: No Tiled: No

NUTRIENT RECOMMENDATIONS

Cropping Sequence	Yield Goal	Crop Nutrient Need N	P_2O_5	K_2O	Fertilizer Credits Legume N	Manure N	P_2O_5	K_2O	Nutrients to Apply N	P_2O_5	K_2O
	- per acre -	lbs/a			lbs/a		lbs/a		lbs/a		
Corn, grain	191-210 bu	***	0	90	0	0	0	0	***	0	90
Soybean, grain	56-65 bu	0	0	115	0	0	0	0	0	0	115
Corn, silage	16.1-20 ton	140	0	185	0	0	0	0	140	0	185
Wheat, grain + straw	81-100 bu	0	0	130	0	0	0	0	0	0	130

There is no lime recommendation for this rotation. Please see Additional Information below.

*** Please use the new Wisconsin Nitrogen Application Rates table to determine the N Application rate. Table included at end of report.

TEST INTERPRETATION

Cropping Sequence — Very Low | Low | Optimum | High | Very High | Excessive

P
K
Rotation pH

LABORATORY ANALYSIS | LAB USE | MISC

Sample ID	Buf pH	O.M. %	Phosphorus PPM	Potassium PPM	40-60 Lime Req Tbl	Calcium PPM	Magnesium PPM	Boron PPM	Manganese PPM	Zinc PPM	Sulfate Sulfur	Sulfur Acet Index	Texture Code	Sample Density	Buffer Code	Total CEC	% Base Saturation
Adjusted Avg:	6.2	1.8	73	115													
1	5.7	1.3	76	91	2.0								1	1.29	7.1		
2	6.6	1.8	85	146									1	1.16			
3	6.3	1.6	57	109									1	1.16	7.2		

ADDITIONAL INFORMATION

Soil Testing Requirements

Application rates are then determined by the nutrient content of the sludge

Parameter	unit	Algoma	Casco	Denmark
Total Ammonium Nitrogen (NH4-N)	%	4.9	0.18	2.93
Total Kjeldahl Nitrogen	%	8.7	5.2	5.8
Total Phosphorus	%	3.29	2.3	2.32
Water Extractable Phosphorus	%	4.5	0.15	0.18
Total Recoverable Potassium	%	0.0016	0.49	0.427
Total Solids	%	2.68	2.4	1.71

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Kewaunee County Landspreading

Land Use in Kewaunee County

Wisconsin Initiative for Statewide Cooperation on Landscape Analysis and Data (WISCLAND) land-use information included as a layer in the Land & Water Conservation Department's geographic information system (GIS) can be summarized as follows:

Land Use Category	Acres (%)
Agricultural Land	168,902 acres (76.7%)
Barren Land	1,421 acres (>1%)
Forested Wetland	17,373 acres (7.9%)
Grassland	7,502 acres (3.4%)
Urban Areas	1,524 acres (>1%)
Wetland Vegetation	9,519 acres (4.3%)
Wooded Areas	13,994 acres (6.4%)

Kewaunee County Land & Water Resource Management Plan 2010-2019

Kewaunee County Landspreading

- Total Kewaunee County Agriculture Acres

  169,000 acres

- Total Acres Receiving Municipal Sludge

Calendar Year	Total Acres receiving biosolids & septage	% of Ag Land Kewaunee County
2016	201	0.1%
2017	186	0.1%
2018	193	0.1%

1 card in 19 decks

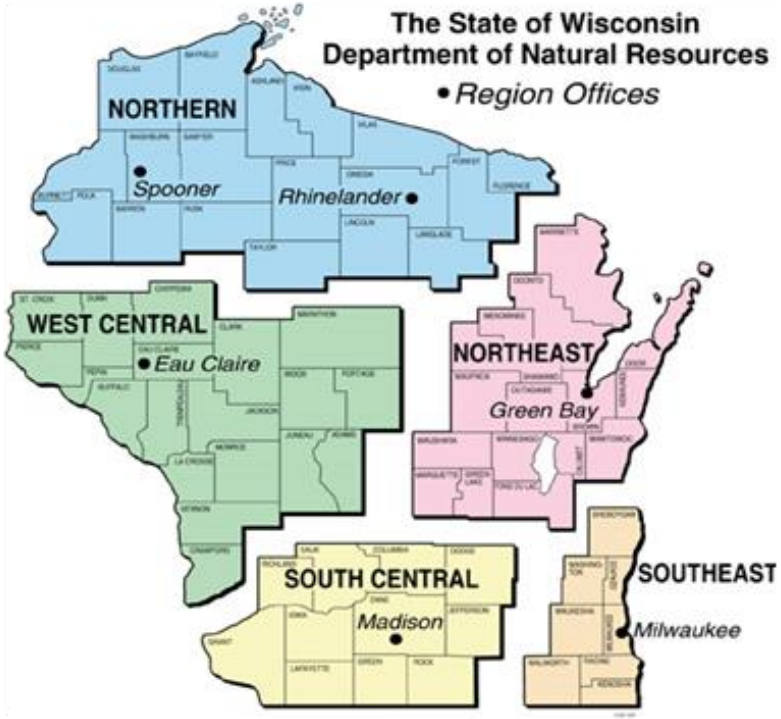
In Summary

- Stringent Federal and even more stringent state regulations are protective of human health and the environment.

- Municipal landspreading occurs on about 1 out of every 1000 of available acres in Kewaunee County

- State requires minimum standards facilities must comply with

Questions?



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